PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

Water Temperatures of the Nation and Mesilinka River Systems 1994

A. R. Langston and R. J. Zemlak
November 1994

PWFWCP Report No. 79

105-02539/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation A. R. Langston and R. J. Zemlak. November 1994. Water temperatures of the Nation and Mesilinka River systems 1994. Peace/Williston Fish and Wildlife Compensation Program. Report No. 79. 22pp.

Author(s) Arne Langston[1] and Randy J. Zemlak[1]
Address(es) [1] Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave., 3rd Floor Prince George, B.C. V2L 3H9

TABLE OF CONTENTS

Table of Contents ii

Introduction 1

Study area 1

Methods and Materials 5

Results 5

- Blackpine (Mesilinka River mainstem) 6
- Carina Creek (Mesilinka tributary) 8
- Control Creek (Mesilinka tributary) 10
- Culvert Creek (Mesilinka tributary) 12
- Fatfish Creek (Mesilinka tributary) 14
- Gopherhole Creek (Mesilinka tributary) 16
- "Gratton's" (Mesilinka River mainstem) 18
- Nation River mainstem 20

References 22

INTRODUCTION

During the 1991 summer field season (June - October) rivers within the Williston Reservoir Watershed were investigated to identify a suitable system for a pilot stream fertilization project. Studies of chemical, physical, and biological characteristics of Williston Watershed rivers (Barrett and Halsey 1985, Bruce and Starr 1985, Langston and Blackman 1993) were reviewed and suitable systems selected for preliminary analysis.

The Mesilinka River was selected as the most suitable system for the pilot project of nutrient enrichment. The Nation River was identified as a system which would also benefit greatly from a fertilization program, but would not meet as many of the pilot project objectives as the Mesilinka River (ie. The Mesilinka River is considered to be more representative of the rivers found in the Williston Watershed). Results and methodologies of the 1991 preliminary studies are reported in "Stream fertilization feasibility study 1991 data report" (Langston, 1992).

In 1992 a five year pilot project was initiated on the Mesilinka River to assess the success of a fertilization program on a Northern B.C. interior river system. This data report summarizes the water temperature data collected from the Mesilinka and Nation Rivers during the summer of 1994. This data is one component of the essential information required to facilitate the proper experimental design of the nutrient enrichment program.

Water temperature data reports (Langston 1992, 1993) have been produced for these river systems as part of the Fertilization project in 1991, 1992, and 1993.

STUDY AREA

The Williston watershed is located in north central British Columbia with its southern boundary 40 km. north of Prince George. The watershed area is 70,860 km^2. The study area and rivers examined are depicted in figures 1,2, and 3. A more detailed description of the study area is available in the "Williston Lake Fisheries Compensation Program management plan" (Blackman et al 1990).

figure 1

MESILINKA RIVER

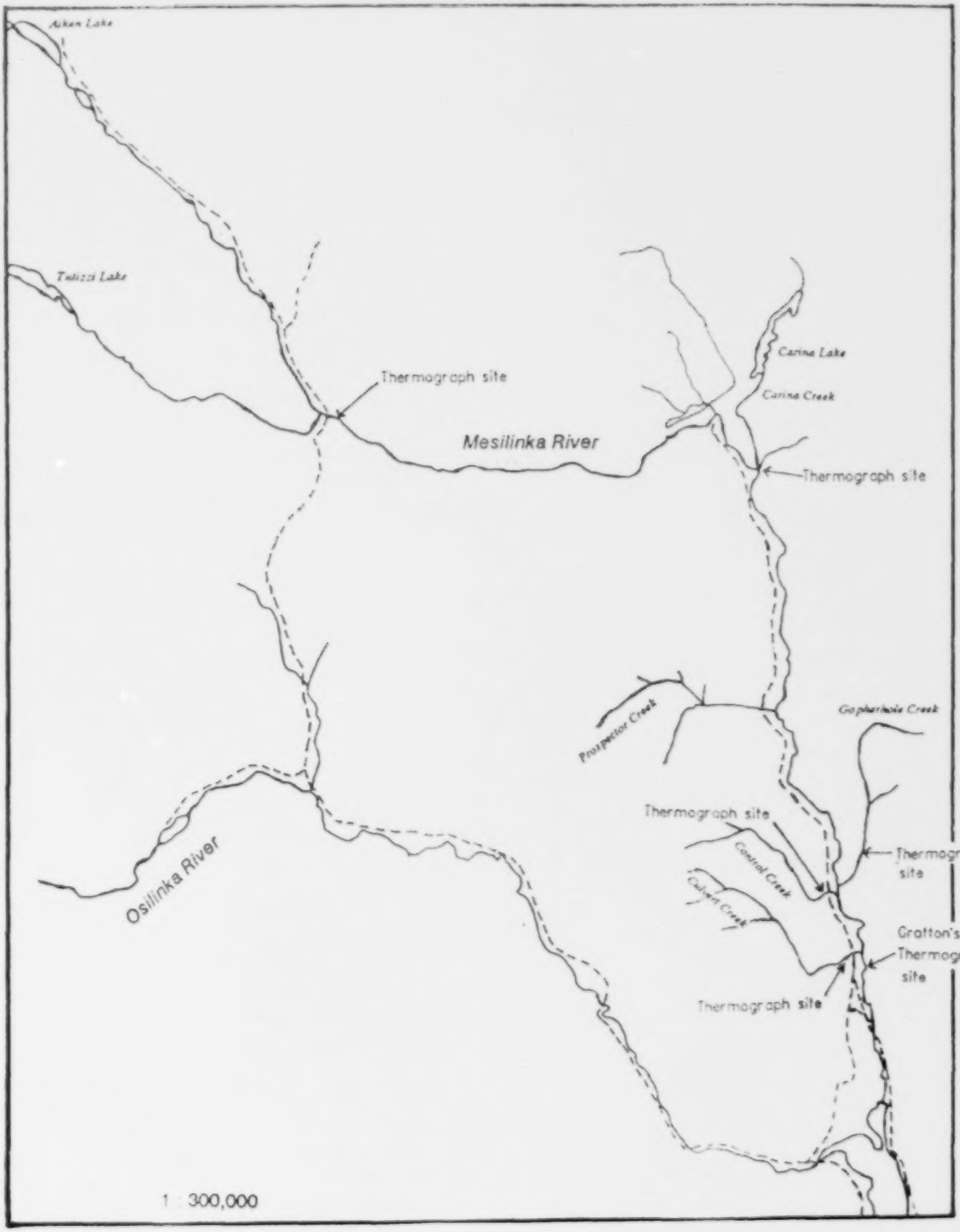


figure 2

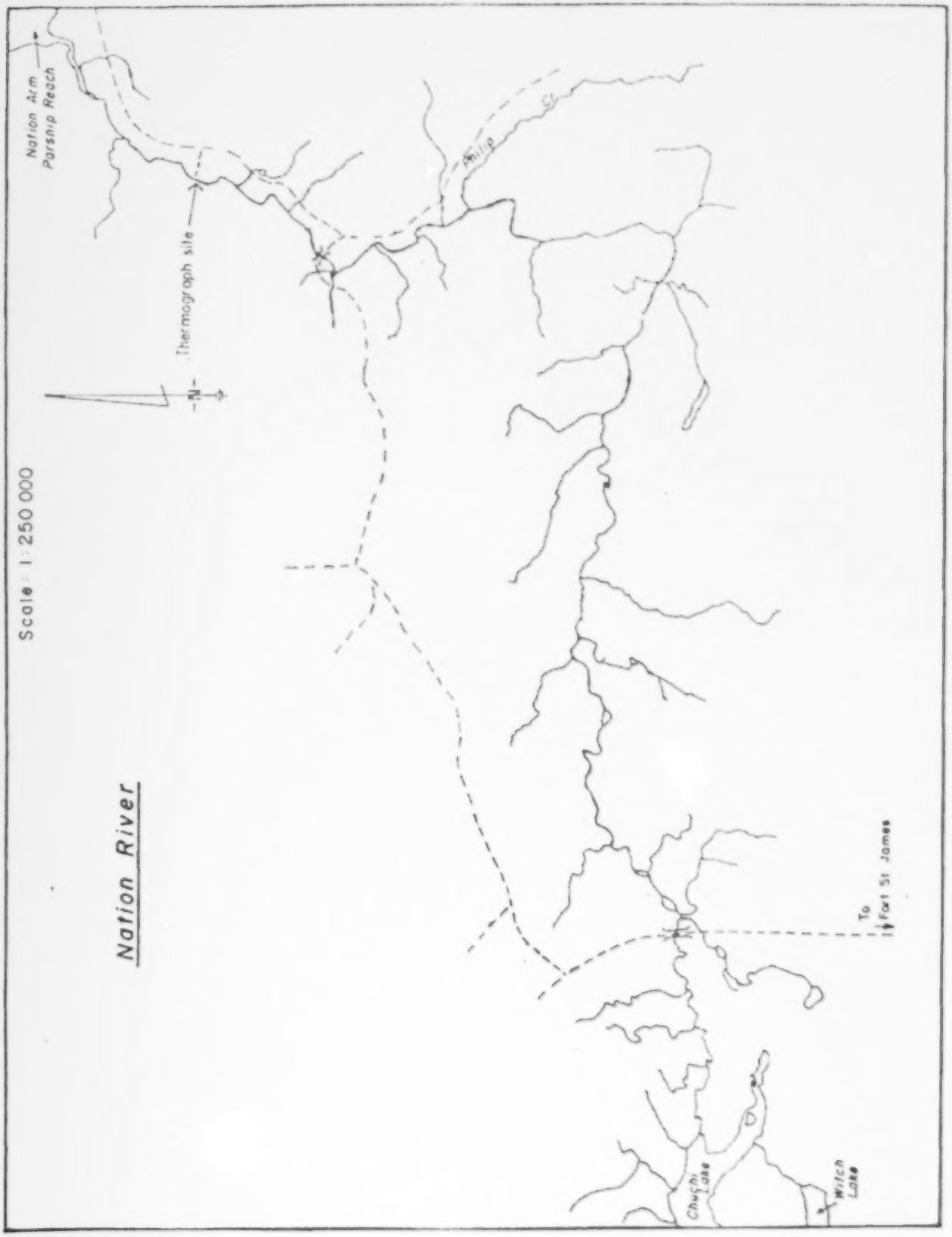

Nation River
Scale 1:250 000
Nation Arm
Parsnip Reach
Thermograph site
N
Nation R.
To
Fort St James
Chuchi Lake
Wilch Lake

figure 3

METHODS AND MATERIALS

Water temperatures were monitored at preselected locations (see figure 2 for Mesilinka River system sites) with temperature recording data loggers (Onset Instruments Stowaway miniature data loggers). These units are certified to be accurate to + 0.2° C. Nation River water temperatures were monitored at the Water Survey of Canada study site (figure 3). The Temperature Dataloggers were programmed to record water temperatures at two hour sampling intervals. The sites were checked occasionally to ensure the units were completely submerged.

RESULTS

No formal discussion of the results is presented as this data report is intended primarily as an information source only. Water temperature data results are presented in table and graph format. Mean temperatures by; month, and sampling period duration, are summarized and presented in table 1.

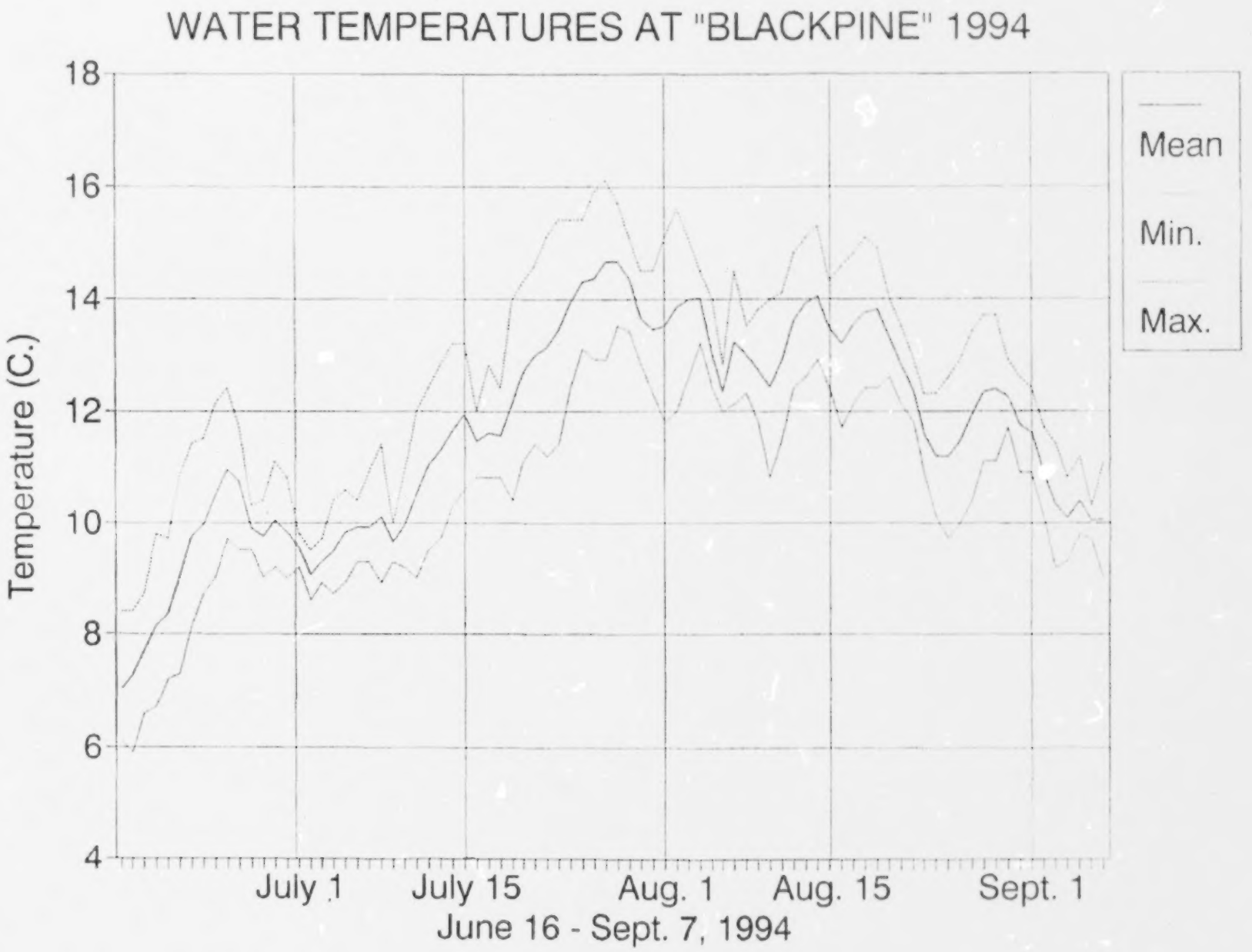
Table 1. Mean water temperatures by; month, and sampling period duration.

LOCATION	RECORDING PERIOD	JUNE	JULY	AUG.	SEPT.	DURATION
"Blackpine"	June 16 - September 7	9.3	11.8	12.9	10.5	11.6
Carina	June 22 - September 7	11.1	12.2	13.4	10.7	12.4
Control	June 14 - June 19	4.4				4.4
Culvert	June 14 - September 7	6.8	9.1	10.0	8.0	8.9
Fatfish	June 22 - September 3	8.1	9.8	7.4	7.1	8.5
Gopherhole	June 14 - September 7	6.7	8.9	10.6	8.5	9.0
"Gratton's"	June 22 - September 7	11.1	12.2	13.4	10.7	12.4
Nation R	June 23 - September 4	14.6	16.1	17.0	14.2	16.2

The Control Creek Temperature Datalogger was damaged due to rocks wearing away the protective case resulting in water damage to the instrument. A "salvage" was performed by Onset Instruments Laboratory, however only June 14 to June 19 data was possible to retrieve.

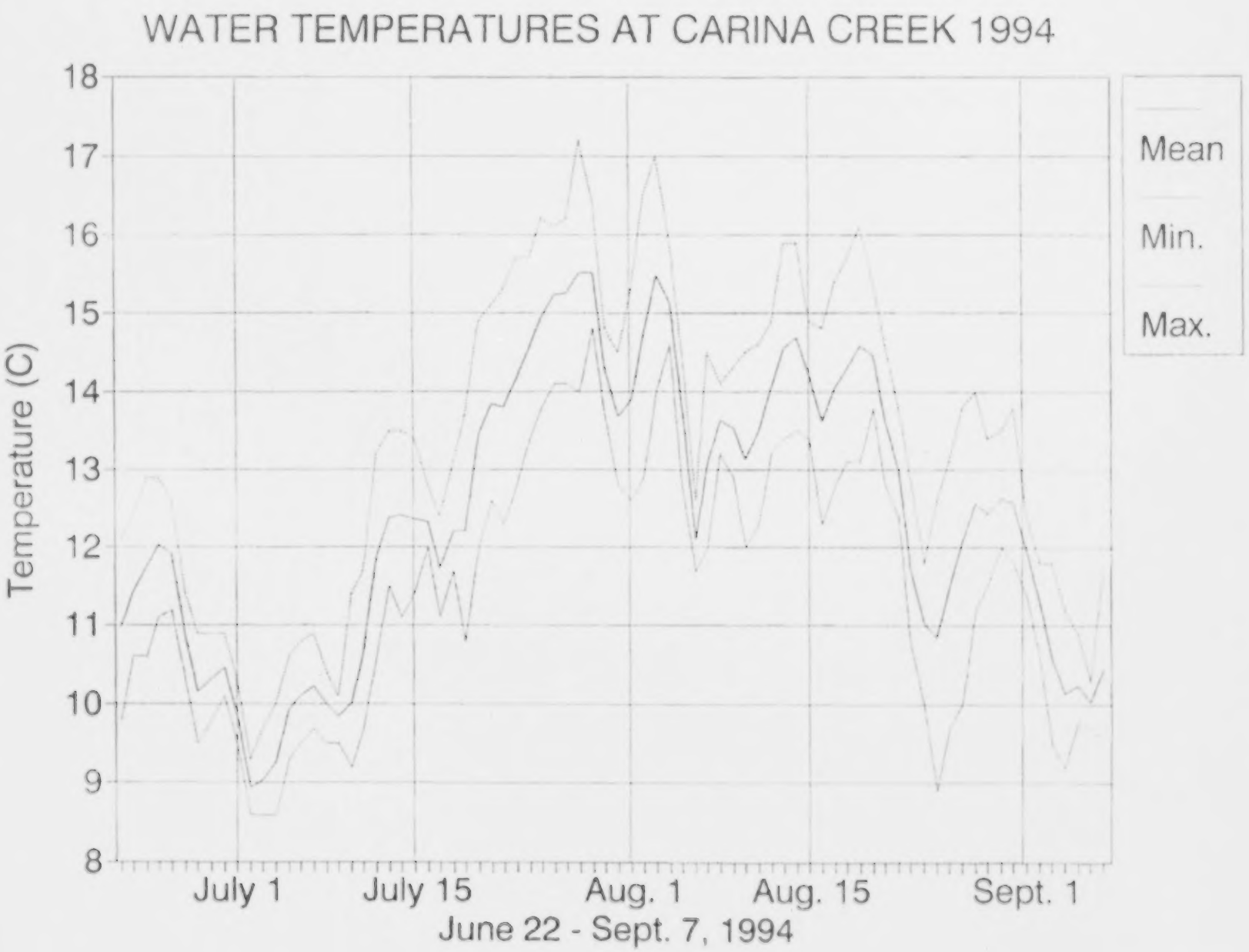
WATER TEMPERATURES AT "BLACKPINE" 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	9.6	9.2	9.8	Aug. 1	13.5	11.8	15.1	Sept. 1	11.6	10.9	12.4
June 2				July 2	9.1	8.6	9.5	Aug. 2	13.8	12	15.6	Sept. 2	10.9	10.1	11.7
June 3				July 3	9.3	8.9	9.7	Aug. 3	14.0	12.6	15.1	Sept. 3	10.3	9.2	11.4
June 4				July 4	9.5	8.7	10.4	Aug. 4	14.0	13.2	14.5	Sept. 4	10.1	9.3	10.8
June 5				July 5	9.8	8.9	10.6	Aug. 5	13.0	12.4	14	Sept. 5	10.4	9.8	11.2
June 6				July 6	9.9	9.3	10.4	Aug. 6	12.3	12	12.8	Sept. 6	10.0	9.7	10.3
June 7				July 7	9.9	9.3	10.9	Aug. 7	13.2	12.1	14.5	Sept. 7	10.1	9	11.1
June 8				July 8	10.1	8.9	11.4	Aug. 8	13.0	12.3	13.5	Sept. 8			
June 9				July 9	9.6	9.3	10	Aug. 9	12.7	11.8	13.8	Sept. 9			
June 10				July 10	10.0	9.2	10.9	Aug. 10	12.4	10.8	14	Sept. 10			
June 11				July 11	10.5	9	12	Aug. 11	12.9	11.5	14.1	Sept. 11			
June 12				July 12	11.0	9.5	12.4	Aug. 12	13.6	12.4	14.8	Sept. 12			
June 13				July 13	11.3	9.7	12.8	Aug. 13	13.9	12.6	15.1	Sept. 13			
June 14				July 14	11.6	10.3	13.2	Aug. 14	14.0	12.9	15.3	Sept. 14			
June 15				July 15	11.9	10.6	13.2	Aug. 15	13.5	12.4	14.3	Sept. 15			
June 16	7.0	6.1	8.4	July 16	11.5	10.8	12	Aug. 16	13.2	11.7	14.6	Sept. 16			
June 17	7.3	5.9	8.4	July 17	11.6	10.8	12.8	Aug. 17	13.5	12.1	14.8	Sept. 17			
June 18	7.7	6.6	8.7	July 18	11.6	10.8	12.4	Aug. 18	13.8	12.4	15.1	Sept. 18			
June 19	8.1	6.7	9.8	July 19	12.1	10.4	14	Aug. 19	13.8	12.4	14.9	Sept. 19			
June 20	8.4	7.2	9.7	July 20	12.7	11.1	14.3	Aug. 20	13.3	12.6	14	Sept. 20			
June 21	9.0	7.3	10.8	July 21	13.0	11.4	14.6	Aug. 21	12.8	12.1	13.5	Sept. 21			
June 22	9.7	8.1	11.4	July 22	13.1	11.2	15.1	Aug. 22	12.4	11.8	12.9	Sept. 22			
June 23	10.0	8.7	11.5	July 23	13.4	11.4	15.4	Aug. 23	11.6	10.9	12.3	Sept. 23			
June 24	10.5	9	12.1	July 24	13.9	12.4	15.4	Aug. 24	11.2	10.1	12.3	Sept. 24			
June 25	10.9	9.7	12.4	July 25	14.3	13.1	15.4	Aug. 25	11.2	9.7	12.6	Sept. 25			
June 26	10.7	9.5	11.7	July 26	14.4	12.9	15.9	Aug. 26	11.5	10	12.9	Sept. 26			
June 27	9.9	9.5	10.3	July 27	14.7	12.9	16.1	Aug. 27	11.9	10.4	13.4	Sept. 27			
June 28	9.7	9	10.4	July 28	14.7	13.5	15.7	Aug. 28	12.3	11.1	13.7	Sept. 28			
June 29	10.0	9.2	11.1	July 29	14.4	13.4	15.1	Aug. 29	12.4	11.1	13.7	Sept. 29			
June 30	9.8	9	10.8	July 30	13.7	12.8	14.5	Aug. 30	12.2	11.7	12.9	Sept. 30			
				July 31	13.4	12.3	14.5	Aug. 31	11.8	10.9	12.6	Sept. 31			


WATER TEMPERATURES AT "BLACKPINE" 1994
Temperature (C.)
18
16
14
12
10
8
6
4
July 1
July 15
Aug. 1
Aug. 15
Sept. 1
June 16 - Sept. 7, 1994
Mean
Min.
Max.

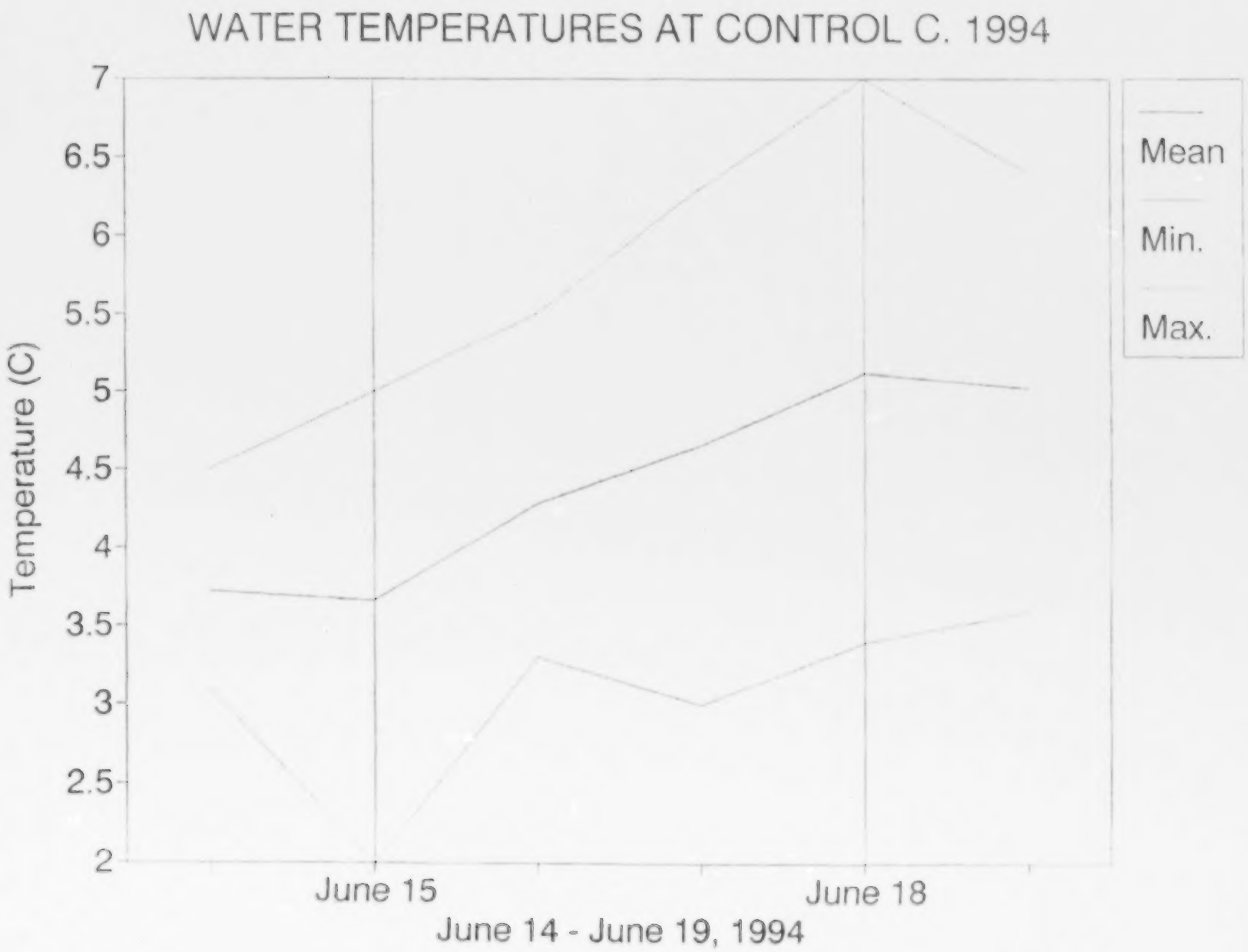
WATER TEMPERATURES AT CARINA CREEK 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	9.9	9.5	10.3	Aug. 1	13.9	12.6	15.3	Sept. 1	11.9	11.4	12.4
June 2				July 2	8.9	8.6	9.3	Aug. 2	14.7	12.9	16.5	Sept. 2	11.3	10.6	11.8
June 3				July 3	9.0	8.6	9.7	Aug. 3	15.5	14.0	17.0	Sept. 3	10.6	9.5	11.8
June 4				July 4	9.3	8.6	10.0	Aug. 4	15.1	14.6	15.9	Sept. 4	10.1	9.2	11.2
June 5				July 5	9.9	9.3	10.6	Aug. 5	13.8	12.8	14.5	Sept. 5	10.3	9.8	10.9
June 6				July 6	10.1	9.5	10.8	Aug. 6	12.1	11.7	12.6	Sept. 6	10.0	9.7	10.3
June 7				July 7	10.2	9.7	10.9	Aug. 7	13.1	12.0	14.5	Sept. 7	10.5	9.5	11.7
June 8				July 8	10.0	9.5	10.4	Aug. 8	13.6	13.2	14.1	Sept. 8			
June 9				July 9	9.8	9.5	10.1	Aug. 9	13.5	12.9	14.3	Sept. 9			
June 10				July 10	10.0	9.2	11.4	Aug. 10	13.1	12.0	14.5	Sept. 10			
June 11				July 11	10.7	9.7	11.7	Aug. 11	13.5	12.3	14.6	Sept. 11			
June 12				July 12	11.9	10.6	13.2	Aug. 12	14.1	13.2	14.9	Sept. 12			
June 13				July 13	12.4	11.5	13.5	Aug. 13	14.6	13.4	15.9	Sept. 13			
June 14				July 14	12.4	11.1	13.5	Aug. 14	14.7	13.5	15.9	Sept. 14			
June 15				July 15	12.4	11.4	13.4	Aug. 15	14.2	13.4	14.9	Sept. 15			
June 16				July 16	12.3	12.0	12.8	Aug. 16	13.6	12.3	14.8	Sept. 16			
June 17				July 17	11.7	11.1	12.4	Aug. 17	14.1	12.8	15.4	Sept. 17			
June 18				July 18	12.2	11.7	13.1	Aug. 18	14.3	13.1	15.7	Sept. 18			
June 19				July 19	12.2	10.8	13.7	Aug. 19	14.6	13.1	16.1	Sept. 19			
June 20				July 20	13.5	12.0	14.9	Aug. 20	14.5	13.8	15.4	Sept. 20			
June 21				July 21	13.8	12.6	15.1	Aug. 21	13.6	12.8	14.6	Sept. 21			
June 22	11.0	9.8	12.1	July 22	13.8	12.3	15.3	Aug. 22	13.0	12.4	13.8	Sept. 22			
June 23	11.4	10.6	12.4	July 23	14.2	12.8	15.7	Aug. 23	11.7	10.8	12.9	Sept. 23			
June 24	11.7	10.6	12.9	July 24	14.6	13.4	15.7	Aug. 24	11.0	10.0	11.8	Sept. 24			
June 25	12.0	11.1	12.9	July 25	14.9	13.8	16.2	Aug. 25	10.8	8.9	12.6	Sept. 25			
June 26	11.9	11.2	12.6	July 26	15.2	14.1	16.1	Aug. 26	11.5	9.7	13.1	Sept. 26			
June 27	10.8	10.3	11.4	July 27	15.3	14.1	16.2	Aug. 27	12.1	10.0	13.8	Sept. 27			
June 28	10.2	9.5	10.9	July 28	15.5	14.0	17.2	Aug. 28	12.6	11.2	14.0	Sept. 28			
June 29	10.3	9.8	10.9	July 29	15.5	14.8	16.4	Aug. 29	12.4	11.5	13.4	Sept. 29			
June 30	10.5	10.1	10.9	July 30	14.3	13.7	14.8	Aug. 30	12.6	12.0	13.5	Sept. 30			
				July 31	13.7	12.8	14.5	Aug. 31	12.6	11.8	13.8	Sept. 31			


WATER TEMPERATURES AT CARINA CREEK 1994
Temperature (C)
18
17
16
15
14
13
12
11
10
9
8
July 1
July 15
Aug. 1
Aug. 15
Sept. 1
June 22 - Sept. 7, 1994
Mean
Min.
Max.

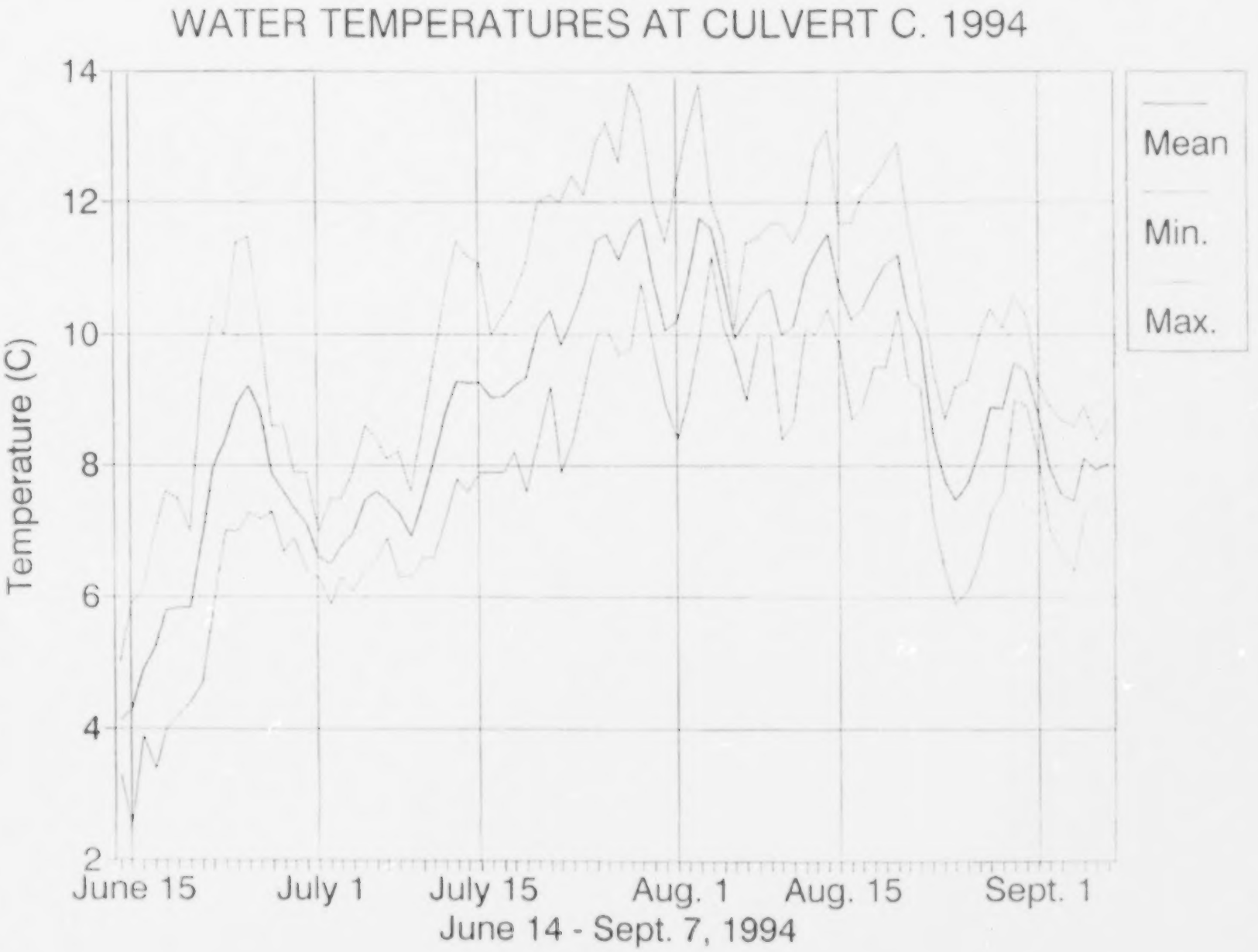
WATER TEMPERATURES AT CONTROL CREEK 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1				Aug. 1				Sept. 1			
June 2				July 2				Aug. 2				Sept. 2			
June 3				July 3				Aug. 3				Sept. 3			
June 4				July 4				Aug. 4				Sept. 4			
June 5				July 5				Aug. 5				Sept. 5			
June 6				July 6				Aug. 6				Sept. 6			
June 7				July 7				Aug. 7				Sept. 7			
June 8				July 8				Aug. 8				Sept. 8			
June 9				July 9				Aug. 9				Sept. 9			
June 10				July 10				Aug. 10				Sept. 10			
June 11				July 11				Aug. 11				Sept. 11			
June 12				July 12				Aug. 12				Sept. 12			
June 13				July 13				Aug. 13				Sept. 13			
June 14	3.7	3.1	4.5	July 14				Aug. 14				Sept. 14			
June 15	3.7	2	5	July 15				Aug. 15				Sept. 15			
June 16	4.3	3.3	5.5	July 16				Aug. 16				Sept. 16			
June 17	4.7	3	6.3	July 17				Aug. 17				Sept. 17			
June 18	5.1	3.4	7	July 18				Aug. 18				Sept. 18			
June 19	5.0	3.6	6.4	July 19				Aug. 19				Sept. 19			
June 20				July 20				Aug. 20				Sept. 20			
June 21				July 21				Aug. 21				Sept. 21			
June 22				July 22				Aug. 22				Sept. 22			
June 23				July 23				Aug. 23				Sept. 23			
June 24				July 24				Aug. 24				Sept. 24			
June 25				July 25				Aug. 25				Sept. 25			
June 26				July 26				Aug. 26				Sept. 26			
June 27				July 27				Aug. 27				Sept. 27			
June 28				July 28				Aug. 28				Sept. 28			
June 29				July 29				Aug. 29				Sept. 29			
June 30				July 30				Aug. 30				Sept. 30			
June 31				July 31				Aug. 31				Sept. 31			


WATER TEMPERATURES AT CONTROL C. 1994
Temperature (C)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
June 15
June 18
June 14 - June 19, 1994
Mean
Min.
Max.

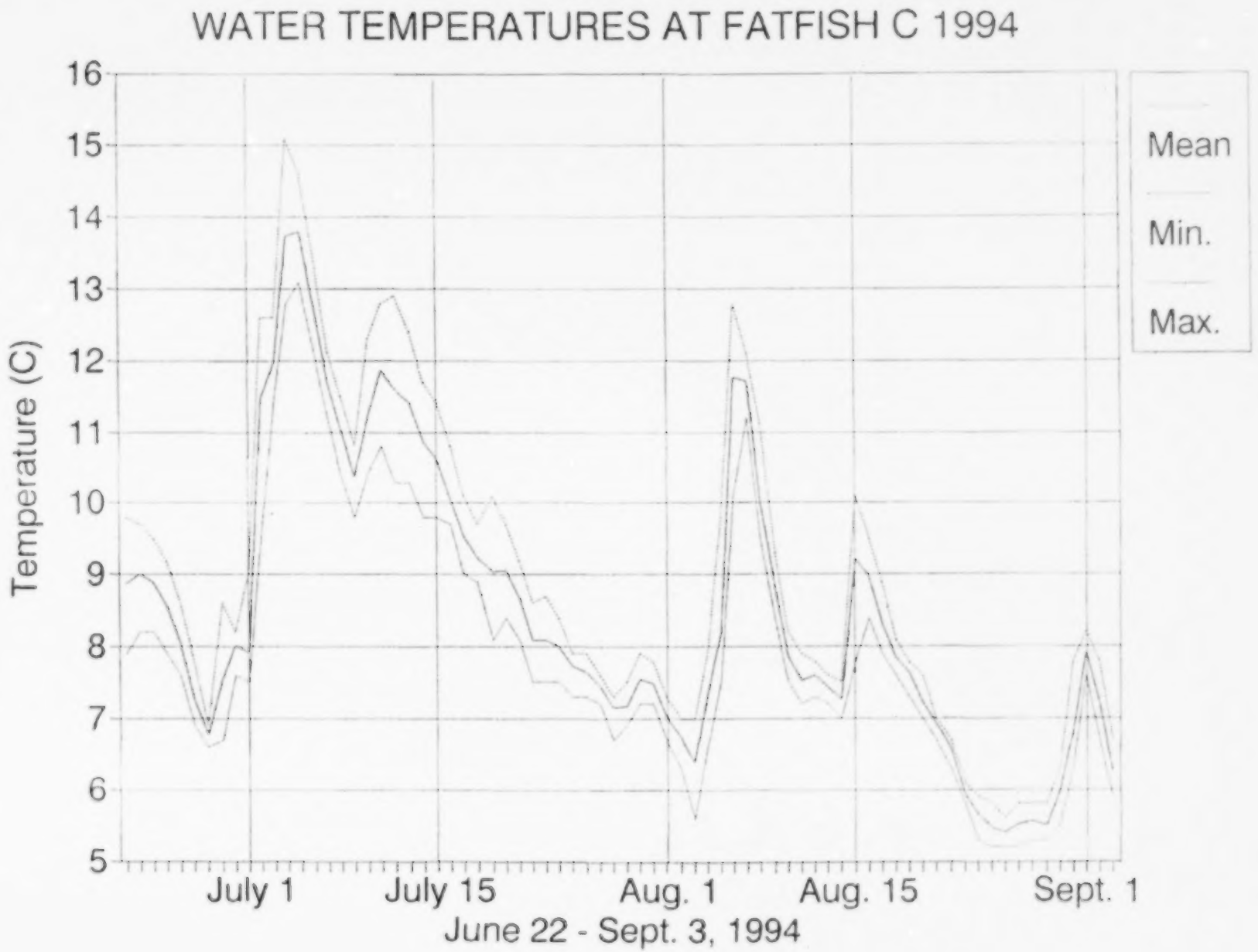
WATER TEMPERATURES AT CULVERT CREEK 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	6.6	6.3	7	Aug. 1	10.2	8.4	12.3	Sept. 1	8.8	8.2	9.3
June 2				July 2	6.5	5.9	7.5	Aug. 2	10.9	9	13.1	Sept. 2	8.0	7	8.9
June 3				July 3	6.8	6.3	7.5	Aug. 3	11.8	10	13.8	Sept. 3	7.6	6.7	8.7
June 4				July 4	7.0	6.1	7.9	Aug. 4	11.6	11.2	12	Sept. 4	7.5	6.4	8.6
June 5				July 5	7.5	6.4	8.6	Aug. 5	10.8	10.1	11.5	Sept. 5	8.1	7.3	8.9
June 6				July 6	7.6	6.6	8.4	Aug. 6	9.9	9.7	10.1	Sept. 6	7.9	7.5	8.4
June 7				July 7	7.5	6.9	8.1	Aug. 7	10.2	9	11.4	Sept. 7	8.1	7.3	8.7
June 8				July 8	7.3	6.3	8.2	Aug. 8	10.6	10	11.5	Sept. 8			
June 9				July 9	6.9	6.3	7.6	Aug. 9	10.7	10	11.7	Sept. 9			
June 10				July 10	7.5	6.6	8.6	Aug. 10	10.0	8.4	11.7	Sept. 10			
June 11				July 11	8.1	6.6	9.5	Aug. 11	10.1	8.7	11.4	Sept. 11			
June 12				July 12	8.8	7.2	10.6	Aug. 12	10.9	10.1	11.8	Sept. 12			
June 13				July 13	9.3	7.8	11.4	Aug. 13	11.2	10	12.8	Sept. 13			
June 14	4.1	3.3	5	July 14	9.3	7.6	11.2	Aug. 14	11.5	10.4	13.1	Sept. 14			
June 15	4.3	2.5	5.9	July 15	9.3	7.9	11.1	Aug. 15	10.7	9.8	11.7	Sept. 15			
June 16	4.9	3.9	6.1	July 16	9.0	7.9	10	Aug. 16	10.2	8.7	11.7	Sept. 16			
June 17	5.2	3.4	7	July 17	9.1	7.9	10.3	Aug. 17	10.4	8.9	12.1	Sept. 17			
June 18	5.8	4	7.6	July 18	9.2	8.2	10.6	Aug. 18	10.8	9.5	12.3	Sept. 18			
June 19	5.8	4.2	7.5	July 19	9.3	7.6	11.1	Aug. 19	11.1	9.5	12.6	Sept. 19			
June 20	5.8	4.4	7	July 20	10.1	8.4	12	Aug. 20	11.2	10.4	12.9	Sept. 20			
June 21	6.9	4.7	9.3	July 21	10.4	9.2	12.1	Aug. 21	10.4	9.3	11.7	Sept. 21			
June 22	7.9	5.8	10.3	July 22	9.8	7.9	12	Aug. 22	10.0	9.2	10.8	Sept. 22			
June 23	8.4	7	10	July 23	10.2	8.4	12.4	Aug. 23	8.4	7.2	9.5	Sept. 23			
June 24	9.0	7	11.4	July 24	10.7	9.2	12.1	Aug. 24	7.8	6.4	8.7	Sept. 24			
June 25	9.2	7.3	11.5	July 25	11.4	10	12.9	Aug. 25	7.5	5.9	9.2	Sept. 25			
June 26	8.8	7.2	10.3	July 26	11.5	10.1	13.2	Aug. 26	7.7	6.1	9.3	Sept. 26			
June 27	7.9	7.3	8.6	July 27	11.1	9.7	12.6	Aug. 27	8.2	6.6	10	Sept. 27			
June 28	7.6	6.7	8.6	July 28	11.6	9.8	13.8	Aug. 28	8.9	7.3	10.4	Sept. 28			
June 29	7.3	6.9	7.9	July 29	11.8	10.8	13.4	Aug. 29	8.9	7.6	10.1	Sept. 29			
June 30	7.1	6.4	7.9	July 30	10.8	9.8	12	Aug. 30	9.6	9	10.6	Sept. 30			
				July 31	10.1	8.9	11.4	Aug. 31	9.4	8.9	10.3	Sept. 31			


WATER TEMPERATURES AT CULVERT C. 1994
Temperature (C)
14
12
10
8
6
4
2
June 15
July 1
July 15
Aug. 1
Aug. 15
Sept. 1
June 14 - Sept. 7, 1994
Mean
Min.
Max.

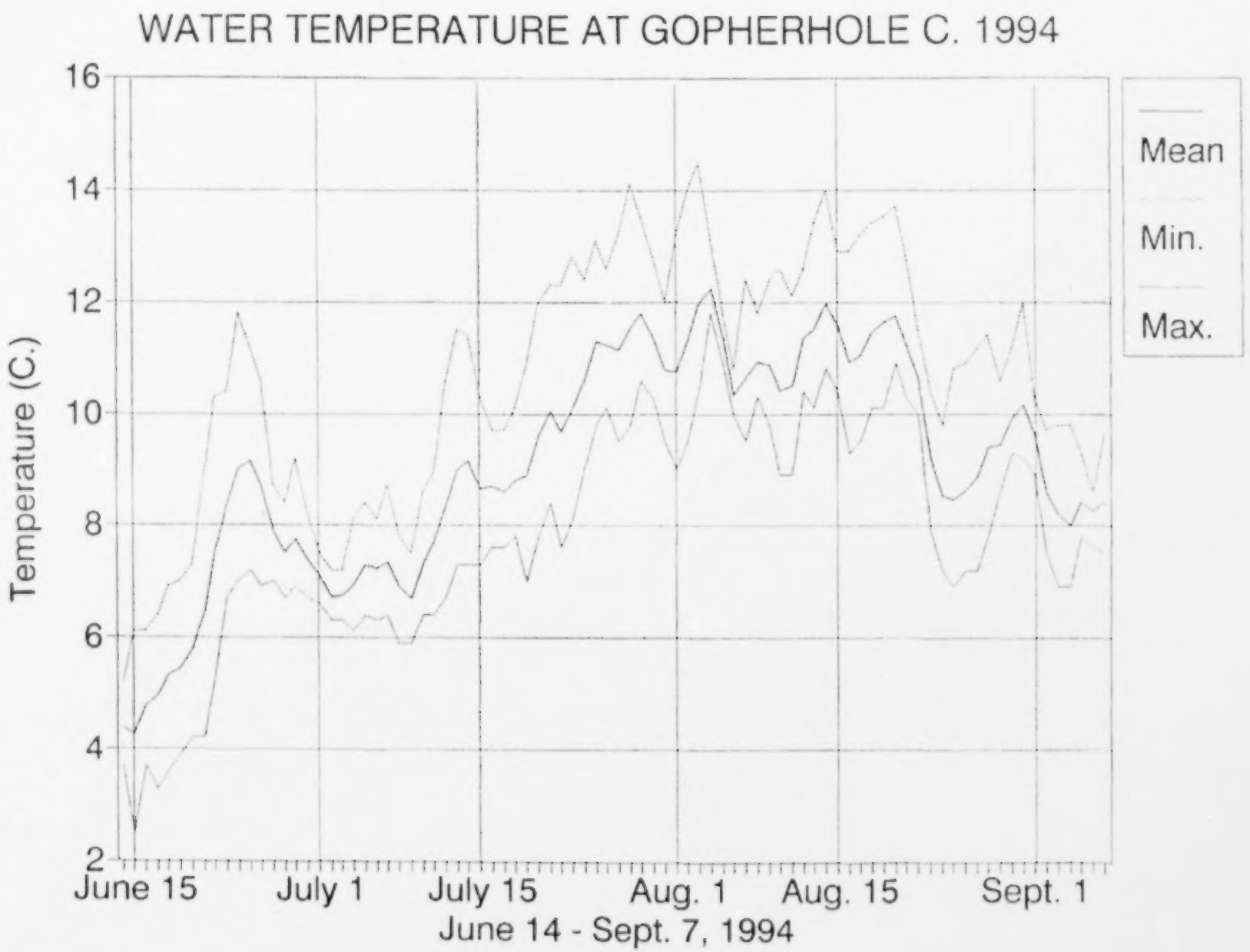
WATER TEMPERATURES AT FATFISH CREEK 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	7.9	7.5	9	Aug. 1	7.0	6.7	7.3	Sept. 1	7.9	7.6	8.2
June 2				July 2	11.5	9.5	12.6	Aug. 2	6.7	6.3	7	Sept. 2	7.2	6.7	7.8
June 3				July 3	11.9	11.4	12.6	Aug. 3	6.4	5.6	7	Sept. 3	6.3	5.9	6.7
June 4				July 4	13.7	12.8	15.1	Aug. 4	7.3	6.6	7.9	Sept. 4			
June 5				July 5	13.8	13.1	14.6	Aug. 5	8.2	7.5	9.8	Sept. 5			
June 6				July 6	12.7	12.1	13.4	Aug. 6	11.8	10.1	12.8	Sept. 6			
June 7				July 7	11.7	11.2	12.1	Aug. 7	11.7	11.2	12.1	Sept. 7			
June 8				July 8	11.0	10.4	11.5	Aug. 8	10.0	9.5	11.1	Sept. 8			
June 9				July 9	10.4	9.8	10.8	Aug. 9	8.8	8.4	9.3	Sept. 9			
June 10				July 10	11.2	10.4	12.3	Aug. 10	7.9	7.5	8.2	Sept. 10			
June 11				July 11	11.9	10.8	12.8	Aug. 11	7.5	7.2	7.9	Sept. 11			
June 12				July 12	11.6	10.3	12.9	Aug. 12	7.6	7.3	7.8	Sept. 12			
June 13				July 13	11.4	10.3	12.4	Aug. 13	7.4	7.2	7.6	Sept. 13			
June 14				July 14	10.9	9.8	11.7	Aug. 14	7.3	7	7.5	Sept. 14			
June 15				July 15	10.6	9.8	11.4	Aug. 15	9.2	7.8	10.1	Sept. 15			
June 16				July 16	10.1	9.7	10.8	Aug. 16	9.0	8.4	9.5	Sept. 16			
June 17				July 17	9.5	9	10.1	Aug. 17	8.3	7.9	8.9	Sept. 17			
June 18				July 18	9.2	8.9	9.7	Aug. 18	7.8	7.6	8.1	Sept. 18			
June 19				July 19	9.0	8.1	10.1	Aug. 19	7.6	7.3	7.8	Sept. 19			
June 20				July 20	9.1	8.4	9.7	Aug. 20	7.2	7	7.6	Sept. 20			
June 21				July 21	8.7	8.1	9.2	Aug. 21	6.9	6.7	7	Sept. 21			
June 22	8.9	7.9	9.8	July 22	8.1	7.5	8.6	Aug. 22	6.6	6.3	6.7	Sept. 22			
June 23	9.0	8.2	9.7	July 23	8.1	7.5	8.7	Aug. 23	5.9	5.8	6.1	Sept. 23			
June 24	8.9	8.2	9.5	July 24	8.0	7.5	8.4	Aug. 24	5.6	5.3	5.9	Sept. 24			
June 25	8.6	7.9	9.2	July 25	7.7	7.3	7.9	Aug. 25	5.5	5.2	5.8	Sept. 25			
June 26	8.0	7.6	8.6	July 26	7.7	7.3	7.9	Aug. 26	5.4	5.2	5.6	Sept. 26			
June 27	7.3	6.9	7.8	July 27	7.5	7.2	7.6	Aug. 27	5.5	5.2	5.8	Sept. 27			
June 28	6.8	6.6	6.9	July 28	7.1	6.7	7.3	Aug. 28	5.6	5.3	5.8	Sept. 28			
June 29	7.6	6.7	8.6	July 29	7.2	6.9	7.5	Aug. 29	5.5	5.3	5.8	Sept. 29			
June 30	8.0	7.6	8.2	July 30	7.6	7.2	7.9	Aug. 30	6.0	5.5	6.3	Sept. 30			
				July 31	7.5	7.2	7.8	Aug. 31	6.8	6.3	7.8	Sept. 31			


WATER TEMPERATURES AT FATFISH C 1994
Temperature (C)
16
15
14
13
12
11
10
9
8
7
6
5
July 1
July 15
Aug. 1
Aug. 15
Sept. 1
June 22 - Sept. 3, 1994
Mean
Min.
Max.

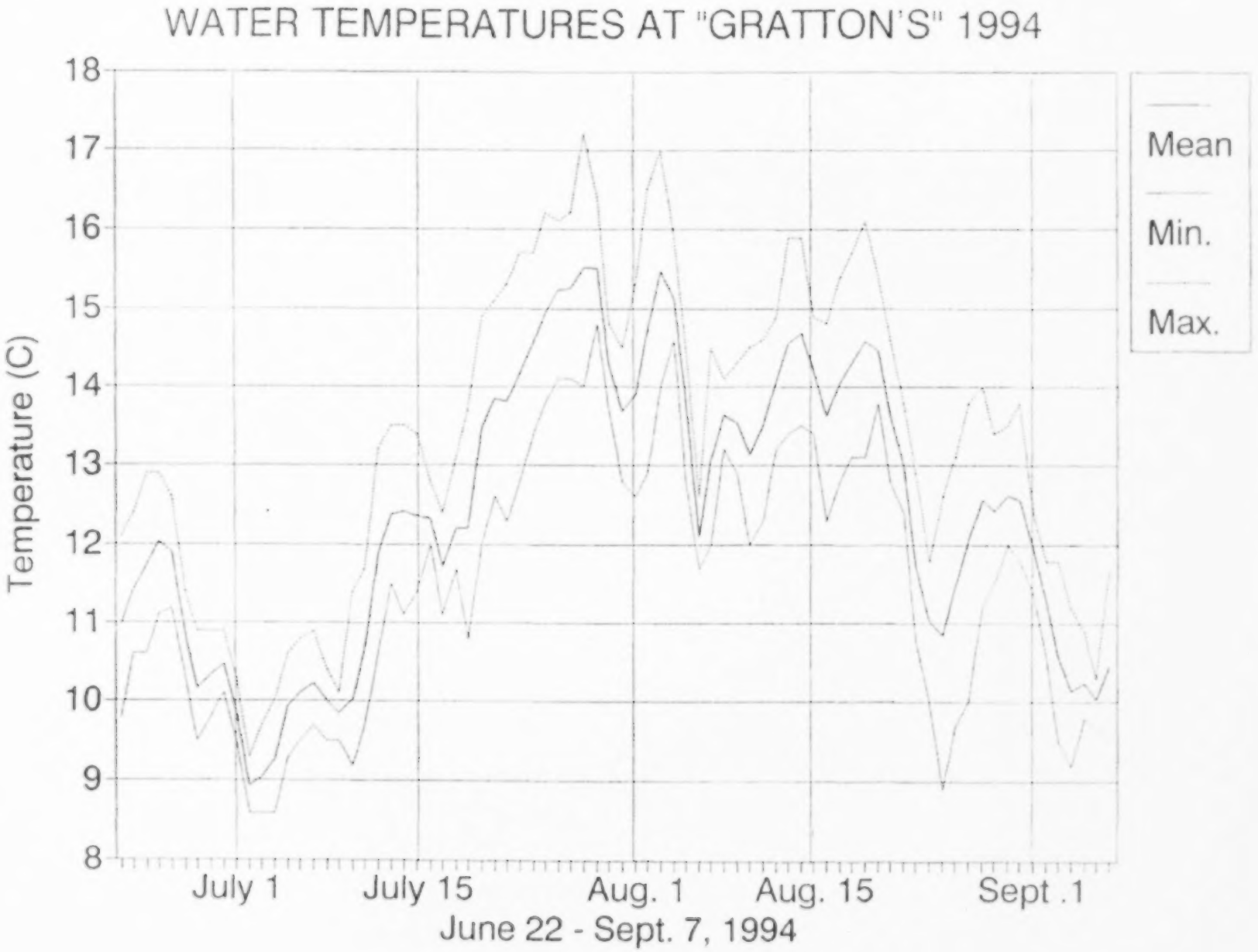
WATER TEMPERATURES AT GOPHERHOLE CREEK 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	7.1	6.6	7.5	Aug. 1	10.8	9.0	13.2	Sept. 1	9.6	8.9	10.3
June 2				July 2	6.7	6.3	7.2	Aug. 2	11.3	9.5	14.0	Sept. 2	8.6	7.5	9.7
June 3				July 3	6.7	6.3	7.2	Aug. 3	12.0	10.4	14.5	Sept. 3	8.2	6.9	9.8
June 4				July 4	6.9	6.1	8.1	Aug. 4	12.2	11.8	13.1	Sept. 4	8.0	6.9	9.8
June 5				July 5	7.3	6.4	8.4	Aug. 5	11.4	10.9	11.8	Sept. 5	8.4	7.8	9.3
June 6				July 6	7.2	6.3	8.1	Aug. 6	10.3	10.0	10.8	Sept. 6	8.2	7.6	8.6
June 7				July 7	7.3	6.4	8.7	Aug. 7	10.6	9.5	12.4	Sept. 7	8.4	7.5	9.7
June 8				July 8	6.9	5.9	7.8	Aug. 8	10.9	10.3	11.8	Sept. 8			
June 9				July 9	6.7	5.9	7.5	Aug. 9	10.9	9.8	12.4	Sept. 9			
June 10				July 10	7.3	6.4	8.6	Aug. 10	10.4	8.9	12.6	Sept. 10			
June 11				July 11	7.7	6.4	8.9	Aug. 11	10.5	8.9	12.1	Sept. 11			
June 12				July 12	8.3	6.7	10.6	Aug. 12	11.4	10.4	12.6	Sept. 12			
June 13				July 13	9.0	7.3	11.5	Aug. 13	11.5	10.1	13.4	Sept. 13			
June 14	4.4	3.7	5.2	July 14	9.1	7.3	11.4	Aug. 14	12.0	10.8	14.0	Sept. 14			
June 15	4.3	2.5	6.1	July 15	8.6	7.3	10.3	Aug. 15	11.6	10.4	12.9	Sept. 15			
June 16	4.8	3.7	6.1	July 16	8.7	7.6	9.7	Aug. 16	10.9	9.3	12.9	Sept. 16			
June 17	4.9	3.3	'6.4	July 17	8.6	7.6	9.7	Aug. 17	11.0	9.5	13.2	Sept. 17			
June 18	5.3	3.6	6.9	July 18	8.8	7.8	10.1	Aug. 18	11.5	10.1	13.4	Sept. 18			
June 19	5.4	3.9	7.0	July 19	8.9	7.0	10.9	Aug. 19	11.6	10.1	13.5	Sept. 19			
June 20	5.8	4.2	7.3	July 20	9.6	7.8	12.0	Aug. 20	11.8	10.9	13.7	Sept. 20			
June 21	6.4	4.2	8.9	July 21	10.0	8.4	12.3	Aug. 21	11.2	10.3	12.8	Sept. 21			
June 22	7.5	5.3	10.3	July 22	9.7	7.6	12.3	Aug. 22	10.7	10.0	11.5	Sept. 22			
June 23	8.4	6.7	10.4	July 23	10.1	8.1	12.8	Aug. 23	9.2	7.9	10.4	Sept. 23			
June 24	9.0	7.0	11.8	July 24	10.6	9.0	12.4	Aug. 24	8.5	7.2	9.8	Sept. 24			
June 25	9.2	7.2	11.2	July 25	11.3	9.8	13.1	Aug. 25	8.4	6.9	10.8	Sept. 25			
June 26	8.7	6.9	10.6	July 26	11.3	10.1	12.6	Aug. 26	8.6	7.2	10.9	Sept. 26			
June 27	7.9	7.0	8.7	July 27	11.2	9.5	13.2	Aug. 27	8.9	7.2	11.2	Sept. 27			
June 28	7.5	6.7	8.4	July 28	11.5	9.8	14.1	Aug. 28	9.4	7.8	11.4	Sept. 28			
June 29	7.7	6.9	9.2	July 29	11.8	10.6	13.5	Aug. 29	9.4	8.6	10.6	Sept. 29			
June 30	7.4	6.7	8.2	July 30	11.4	10.3	12.8	Aug. 30	9.9	9.3	11.2	Sept. 30			
				July 31	10.8	9.5	12.0	Aug. 31	10.2	9.2	12.0	Sept. 31			


WATER TEMPERATURE AT GOPHERHOLE C. 1994
Temperature (C.)
16
14
12
10
8
6
4
2
Mean
Min.
Max.
June 15
July 1
July 15
Aug. 1
Aug. 15
Sept. 1
June 14 - Sept. 7, 1994

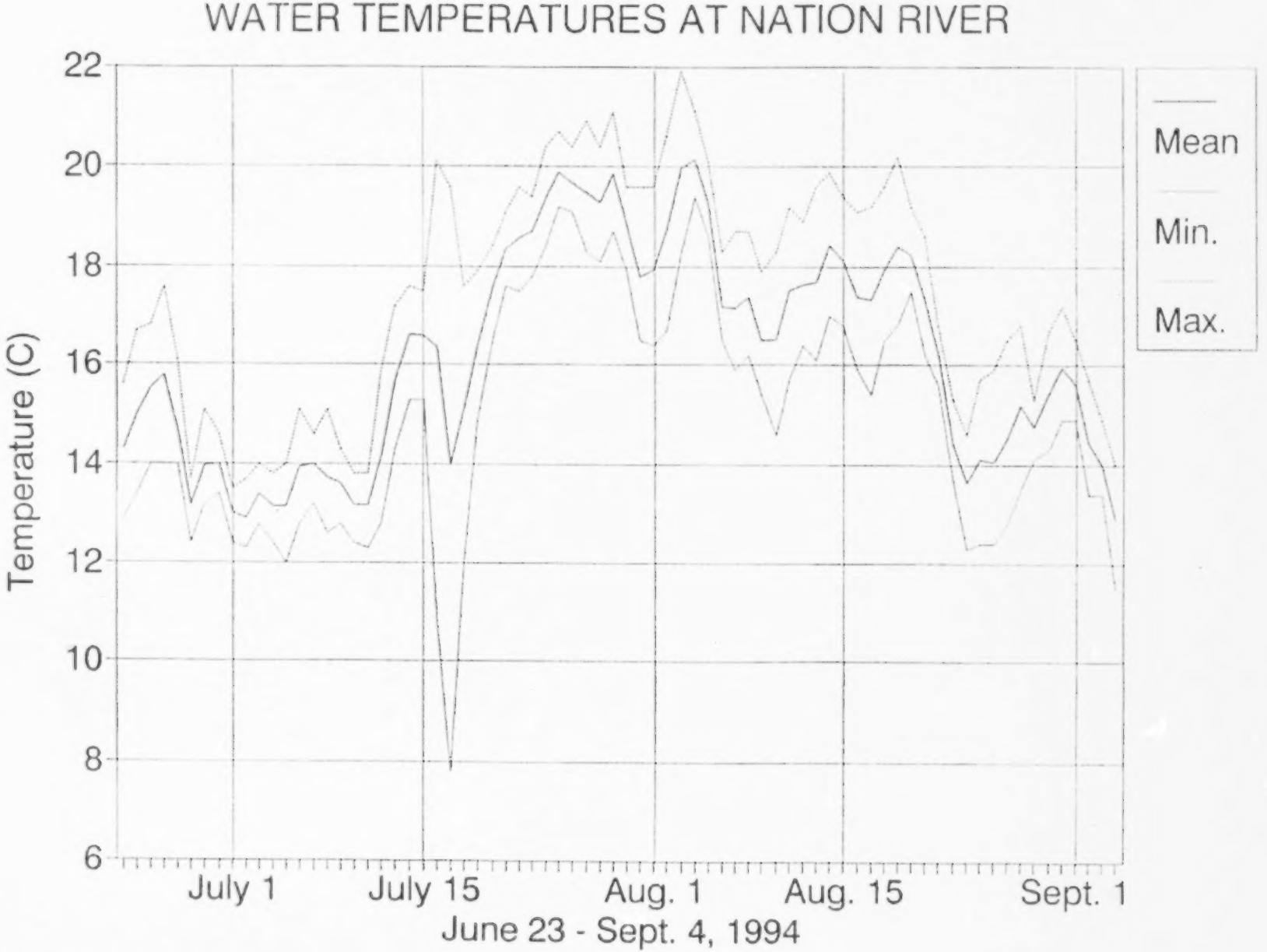
WATER TEMPERATURES AT "GRATTON'S" 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	9.9	9.5	10.3	Aug. 1	13.9	12.6	15.3	Sept. 1	11.9	11.4	12.4
June 2				July 2	8.9	8.6	9.3	Aug. 2	14.7	12.9	16.5	Sept. 2	11.3	10.6	11.8
June 3				July 3	9.0	8.6	9.7	Aug. 3	15.5	14.0	17.0	Sept. 3	10.6	9.5	11.8
June 4				July 4	9.3	8.6	10.0	Aug. 4	15.1	14.6	15.9	Sept. 4	10.1	9.2	11.2
June 5				July 5	9.9	9.3	10.6	Aug. 5	13.8	12.8	14.5	Sept. 5	10.3	9.8	10.9
June 6				July 6	10.1	9.5	10.8	Aug. 6	12.1	11.7	12.6	Sept. 6	10.0	9.7	10.3
June 7				July 7	10.2	9.7	10.9	Aug. 7	13.1	12.0	14.5	Sept. 7	10.5	9.5	11.7
June 8				July 8	10.0	9.5	10.4	Aug. 8	13.6	13.2	14.1	Sept. 8			
June 9				July 9	9.8	9.5	10.1	Aug. 9	13.5	12.9	14.3	Sept. 9			
June 10				July 10	10.0	9.2	11.4	Aug. 10	13.1	12.0	14.5	Sept. 10			
June 11				July 11	10.7	9.7	11.7	Aug. 11	13.5	12.3	14.6	Sept. 11			
June 12				July 12	11.9	10.6	13.2	Aug. 12	14.1	13.2	14.9	Sept. 12			
June 13				July 13	12.4	11.5	13.5	Aug. 13	14.6	13.4	15.9	Sept. 13			
June 14				July 14	12.4	11.1	13.5	Aug. 14	14.7	13.5	15.9	Sept. 14			
June 15				July 15	12.4	11.4	13.4	Aug. 15	14.2	13.4	14.9	Sept. 15			
June 16				July 16	12.3	12.0	12.8	Aug. 16	13.6	12.3	14.8	Sept. 16			
June 17				July 17	11.7	11.1	12.4	Aug. 17	14.1	12.8	15.4	Sept. 17			
June 18				July 18	12.2	11.7	13.1	Aug. 18	14.3	13.1	15.7	Sept. 18			
June 19				July 19	12.2	10.8	13.7	Aug. 19	14.6	13.1	16.1	Sept. 19			
June 20				July 20	13.5	12.0	14.9	Aug. 20	14.5	13.8	15.4	Sept. 20			
June 21				July 21	13.8	12.6	15.1	Aug. 21	13.6	12.8	14.6	Sept. 21			
June 22	11.0	9.8	12.1	July 22	13.8	12.3	15.3	Aug. 22	13.0	12.4	13.8	Sept. 22			
June 23	11.4	10.6	12.4	July 23	14.2	12.8	15.7	Aug. 23	11.7	10.8	12.9	Sept. 23			
June 24	11.7	10.6	12.9	July 24	14.6	13.4	15.7	Aug. 24	11.0	10.0	11.8	Sept. 24			
June 25	12.0	11.1	12.9	July 25	14.9	13.8	16.2	Aug. 25	10.8	8.9	12.6	Sept. 25			
June 26	11.9	11.2	12.6	July 26	15.2	14.1	16.1	Aug. 26	11.5	9.7	13.1	Sept. 26			
June 27	10.8	10.3	11.4	July 27	15.3	14.1	16.2	Aug. 27	12.1	10.0	13.8	Sept. 27			
June 28	10.2	9.5	10.9	July 28	15.5	14.0	17.2	Aug. 28	12.6	11.2	14.0	Sept. 28			
June 29	10.3	9.8	10.9	July 29	15.5	14.8	16.4	Aug. 29	12.4	11.5	13.4	Sept. 29			
June 30	10.5	10.1	10.9	July 30	14.3	13.7	14.8	Aug. 30	12.6	12.0	13.5	Sept. 30			
				July 31	13.7	12.8	14.5	Aug. 31	12.6	11.8	13.8	Sept. 31			


WATER TEMPERATURES AT "GRATTON'S" 1994
Temperature (C)
18
17
16
15
14
13
12
11
10
9
8
July 1
July 15
Aug. 1
Aug. 15
Sept .1
June 22 - Sept. 7, 1994
Mean
Min.
Max.

WATER TEMPERATURES AT NATION RIVER 1994

DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.	DATE	MEAN	MIN.	MAX.
June 1				July 1	13.0	12.4	13.5	Aug. 1	17.9	16.4	19.6	Sept. 1	15.6	14.9	16.5
June 2				July 2	12.9	12.3	13.7	Aug. 2	18.7	16.7	20.6	Sept. 2	14.4	13.4	15.7
June 3				July 3	13.4	12.8	14	Aug. 3	20.0	18.3	21.9	Sept. 3	14.0	13.4	14.9
June 4				July 4	13.2	12.4	13.8	Aug. 4	20.2	19.4	21.1	Sept. 4	12.9	11.5	14
June 5				July 5	13.1	12	14	Aug. 5	19.2	18.6	20.1	Sept. 5			
June 6				July 6	14.0	12.8	15.1	Aug. 6	17.2	16.5	18.3	Sept. 6			
June 7				July 7	14.0	13.2	14.6	Aug. 7	17.2	15.9	18.7	Sept. 7			
June 8				July 8	13.7	12.6	15.1	Aug. 8	17.4	16.2	18.7	Sept. 8			
June 9				July 9	13.6	12.8	14.3	Aug. 9	16.5	15.4	17.9	Sept. 9			
June 10				July 10	13.2	12.4	13.8	Aug. 10	16.5	14.6	18.3	Sept. 10			
June 11				July 11	13.2	12.3	13.8	Aug. 11	17.5	15.7	19.2	Sept. 11			
June 12				July 12	14.2	12.8	15.9	Aug. 12	17.6	16.4	18.9	Sept. 12			
June 13				July 13	15.7	14.3	17.2	Aug. 13	17.7	16.1	19.6	Sept. 13			
June 14				July 14	16.6	15.3	17.6	Aug. 14	18.4	17	19.9	Sept. 14			
June 15				July 15	16.6	15.3	17.5	Aug. 15	18.1	16.8	19.4	Sept. 15			
June 16				July 16	16.4	10.8	20.1	Aug. 16	17.4	15.9	19.1	Sept. 16			
June 17				July 17	14.0	7.8	19.6	Aug. 17	17.3	15.4	19.2	Sept. 17			
June 18				July 18	15.1	12	17.6	Aug. 18	17.9	16.5	19.6	Sept. 18			
June 19				July 19	16.4	14.9	17.9	Aug. 19	18.4	16.8	20.2	Sept. 19			
June 20				July 20	17.6	16.5	18.4	Aug. 20	18.2	17.5	19.2	Sept. 20			
June 21				July 21	18.3	17.6	19.1	Aug. 21	17.3	16.2	18.6	Sept. 21			
June 22				July 22	18.6	17.5	19.6	Aug. 22	16.2	15.6	16.8	Sept. 22			
June 23	14.3	12.9	15.6	July 23	18.7	17.8	19.4	Aug. 23	14.4	13.7	15.3	Sept. 23			
June 24	15.0	13.4	16.7	July 24	19.4	18.4	20.4	Aug. 24	13.7	12.3	14.6	Sept. 24			
June 25	15.5	14	16.8	July 25	19.9	19.2	20.7	Aug. 25	14.1	12.4	15.7	Sept. 25			
June 26	15.8	14	17.6	July 26	19.7	19.1	20.4	Aug. 26	14.1	12.4	15.9	Sept. 26			
June 27	14.7	14	16.1	July 27	19.5	18.3	20.9	Aug. 27	14.5	12.8	16.5	Sept. 27			
June 28	13.2	12.4	13.7	July 28	19.3	18.1	20.4	Aug. 28	15.2	13.5	16.8	Sept. 28			
June 29	14.0	13.2	15.1	July 29	19.9	18.7	21.1	Aug. 29	14.8	14.1	15.3	Sept. 29			
June 30	14.0	13.4	14.6	July 30	18.8	17.9	19.6	Aug. 30	15.4	14.3	16.7	Sept. 30			
				July 31	17.8	16.5	19.6	Aug. 31	15.9	14.9	17.2	Sept. 31			


WATER TEMPERATURES AT NATION RIVER
Temperature (C)
22
20
18
16
14
12
10
8
6
July 1
July 15
Aug. 1
Aug. 15
Sept. 1
June 23 - Sept. 4, 1994
Mean
Min.
Max.

REFERENCES

Barrett, D.T., and T.G. Halsey. 1985. Fisheries resources and fisheries potential of Williston Reservoir and its tributary streams. Vol. 1 Fisheries resources and fisheries potential of Williston Reservoir. B.C. Ministry of Environment Fish. Tech. Circ. 68: 40 p.

Blackman B.G. 1993. Fisheries resources and enhancement potentials of selected tributaries of the Williston Reservoir. Peace/Williston Compensation Program fisheries report. (In preparation) 52 p. plus appendix.

Blackman, B.G., D. Jesson, D. Ableson, and T. Down. 1990. Williston Lake Fisheries Compensation Program management plan.: 38p.

Bruce, P.G., and P.J. Starr. 1985. Fisheries resources and fisheries potential of Williston Reservoir and its tributary streams. (Volume II. Fisheries resources potential of Williston Lake tributaries - A preliminary overview. B.C. Ministry of Environment Fish. Tech. Circ. 69: 101 p.

Langston, A.R. 1992. Stream fertilization feasibility study 1991 data report. Peace/Williston Compensation Program (fisheries) report. 92 p.

Langston, A.R. 1993. Water temperatures of the Nation and Mesilinka River systems 1992. Peace/Williston Compensation Program (fisheries) report. 29 p.

Langston, A.R. 1993. Water temperatures of the Nation and Mesilinka River systems 1993. Peace/Williston Compensation Program (fisheries) report. 46 p.

Langston, A.R., and B.G. Blackman. 1993. Fisheries resources and enhancement potentials of selected tributaries of the Williston Reservoir. Vol. II. Peace/Williston Compensation Program (fisheries) report. 191 p.